

**REMARKS**

Reconsideration and withdrawal of the objections to and rejections of the application are respectfully requested in view of the amendments and remarks herewith, which place the application into condition for allowance.

**I. STATUS OF CLAIMS AND FORMAL MATTERS**

Claims 1-17, 19-28 and 30 are pending in this application. Claims 1-17, 19-28 and 30 are amended, and claims 18 and 29 are cancelled, without prejudice.

No new matter is added by these amendments.

It is submitted that these claims, as originally presented, were in full compliance with the requirements of 35 U.S.C. §112. Changes to these claims, as presented herein, are not made for the purpose of patentability within the meaning of 35 U.S.C. §101, §102, §103, or §112. Rather, these changes are made simply for clarification and to round out the scope of protection to which Applicants are entitled. Support for the amended recitations in the claims is found throughout the specification and from the pending claims.

**II. 35 U.S.C. §112, SECOND PARAGRAPH, REJECTIONS**

Claims 6-9, 11-18 and 20 were rejected under 35 U.S.C. §112, second paragraph, for allegedly being indefinite. The rejection is traversed.

Applicants point out that the Examiner has not provided any bases for the Section 112, second paragraph, rejection. As the Examiner has the burden of making a *prima facie* case, and as the Examiner has failed to meet this burden, the rejection must fail as a matter of law.

Further, the Examiner is respectfully reminded that a claim is definite if the scope of the subject matter embraced by a claim is clear and if the applicant has not otherwise indicated that

he intends the claims to be of a different scope. *In re Borkowski*, 164 U.S.P.Q. 642 (C.C.P.A. 1970). The “distinctly claim” requirement of 35 USC § 112, second paragraph, means that the claims must have a clear and definite meaning when construed in light of the complete patent document. *Standard Oil Co. v. American Cyanamid Co.*, 227 U.S.P.Q. 293 (Fed. Cir. 1985). The test of definiteness is whether one skilled in the art would understand the scope of the claim when read in light of the specification. *Morton Int. Inc. v. Cardinal Chem. Co.*, 28 U.S.P.Q.2d 1190 (Fed. Cir. 1993). And the degree of precision necessary is a function of the subject matter claimed. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 231 U.S.P.Q. 81, 94-95 (Fed. Cir. 1986). Indeed, the Federal Circuit noted in *Hybritech* that:

‘[I]f the claims, read in light of the specification, reasonably apprise those skilled in the art both of the utilization and scope of the invention, and if the language is as precise as the subject matter permits, the courts can demand no more’ [and] the claims are clearly definite.

*Id.* at 94 (citing to *Shatterproof Glass Corp. v. Libbey Owens Ford Co.*, 225 U.S.P.Q. 634, 641 (Fed. Cir. 1985)) (emphasis added).

Applying the law to the instant facts, as the instant claims, read in light of the specification, apprise a skilled artisan of both the utilization and scope of the invention, and as the language is as precise as the subject matter permits, the instant claims are definite. A contrary conclusion, as posited by the Office Action, would not only be against public policy, but would also be impermissible as a matter of law. See *Hybritech*, 231 U.S.P.Q. at 95 (“As a matter of law, no court can demand more.” ).

Consequently, reconsideration and withdrawal of the Section 112 and 101 rejections are respectfully requested.

### III. OBJECTIONS TO THE CLAIMS

Claims 9, 10, 12, 14, 16, 18, 20-22, 25, 26 and 28-30 were objected to under 37 C.F.R. §1.75(c) for alleged informalities. The amendments to the claims render the objection moot.

Further, the Examiner is respectfully invited to review the Preliminary Amendment dated December 20, 2001.

Reconsideration and withdrawal of the objections to the claims are respectfully requested.

### IV. 35 U.S.C. 101 REJECTIONS

Claims 26-30 were rejected under 35 U.S.C. §101 for allegedly reciting a use without setting forth steps involved in the process. The rejection is traversed.

The amendments to the claims render the rejection moot.

Reconsideration and withdrawal of the Section 101 rejection to the claims are respectfully requested.

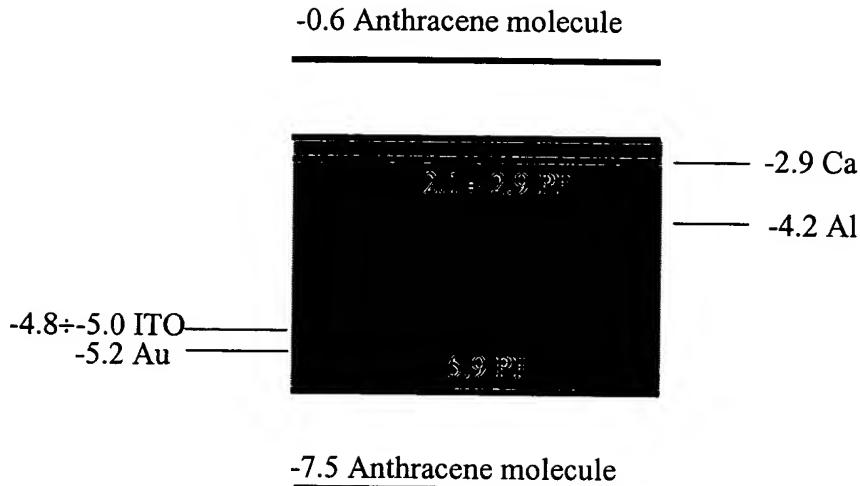
### V. 35 U.S.C. §§102/103 REJECTIONS

Claims 1, 2, 22, 24 and 26 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Lee et al., *2d International Conference on Electroluminescence of Molecular Materials and Related Phenomenon*, vol. 111-112: 195-197 (“Lee”) or Nothofer et al., *Chem. Abstracts 2000* 133: 141917 (“Nothofer”) or Seda et al. *Chem. Abstracts 1996* 125: 342810 (“Seda”); and claims 3-21, 25 and 27-30 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Lee or Nothofer or Seda. The rejections will be collectively addressed

and respectfully traversed. None of the cited documents teaches, suggests, enables or provides the motivation for a skilled artisan to practice the instantly claimed invention.

Lee relates to poly(9,9-bis(3,6-dioxaheptyl)-fluorene-2,7-diyls) which are end-capped with anthracene. In contrast thereto, the polyfluorenes of the present invention are end-capped by groups as defined in present claim 1. The anthracene disclosed in Lee is not capable of facilitating the transport of electrons, holes or ions when it is attached to a polyfluorene. Thus, Lee fails to teach, suggest and enable each and every element of the claimed invention.

More specifically, the polyfluorene (PF) main chain oxidation potential ( $I_p$ ) and the electron affinity ( $E_a$ ) can be experimentally measured by cyclic voltammetry as:  $I_p$  (PF) = -5.88 eV and  $E_a$  (PF) = -2.9 eV. These are measurements in solution. In films of polyfluorene, the values are slightly different, with  $I_p$  (PF) being = -5.8 eV and  $E_a$  (PF) being = -2.12 eV. This means that, if a chemical moiety is to function as a charge-transporting moiety within a polyfluorene in a real device, such as an LED, this chemical moiety must have an  $I_p$  which is at least equal to or preferably less negative than the  $I_p$  of the polyfluorene (= -5.8 eV) (to facilitate hole-transport), or it must have an  $E_a$  which is equal to or more negative than the  $E_a$  of the polyfluorene (= -2.9 or -2.12 eV) (to facilitate electron-transport). An illustration for the allowed zone of energy levels is given in the figure below, i. e. according to the definition for a charge-transporting moiety to function as such within a polyfluorene chain, the  $I_p$  or the  $E_a$  of this moiety must be in the grey-hatched zone:



Lee does not meet this criteria. The energy levels for Lee's anthracene molecules (A) are  $I_p(A) = -7.5$  eV, and  $E_a(A) = -0.6$  eV and are shown above. As seen in the figure, the energy levels for the Lee anthracene molecule are clearly outside the region for charge-transport. Therefore, neither hole transport facilitation ( $I_p(A) \ll I_p(PF)$ ) nor electron transport facilitation ( $E_a(A) \gg E_a(PF)$ ) is possible, when using anthracene as an end-capper of polyfluorenes. Therefore, anthracene is not a charge-transporting moiety when used as an end-capper for polyfluorene, which means that anthracene is not capable of facilitating the transport of electrons, holes or ions, when it is attached to a polyfluorene. As Lee does not teach, enable or suggest the instantly claimed invention, Lee fails as evidence of either anticipation or obviousness.

One of the objectives that the present invention solved was to provide compounds that allow for the fabrication of LEDs with similar or better brightness values and superior temporal stability. The object was solved by preparing a polyfluorene according to instant claim 1. Surprisingly, however, it was discovered that polyfluorenes which are end-capped with groups as defined in claim 1 not only have similar luminance values but better values than the art when

used in a LED. For example poly(2,7-(9,9-bis(2-ethylhexyl))fluorene)-2,7-bis(4-methylphenyl)phenylamine shows a brightness of 1500 cd/m<sup>2</sup> at 9 mol% of end-capping groups. Similar results can be seen in the instant Examples.

The polyfluorenes according to the present invention also show a significantly higher temporal stability in terms of their emission spectra when used in a LED. This is seen, for example, from the insert in figure 5 and page 20 of the instant specification, first and second paragraph, which shows that there is practically no change in the device emission even after more than 15 minutes operation. Thus, the polyfluorenes according to the present invention demonstrate stable colour characteristics. This applies to all devices comprising active layers of polyfluorenes according to the present invention which demonstrate stable colour characteristics, e.g., in terms of their suppression of the green and red parts of the emission spectrum. This is in contrast to the compounds disclosed in Lee. If the Lee compounds are built into a device and are used for 15 minutes of continuous operation, the emission colour changes, the green component gradually increases and the emission spectra broaden (see for example Lee et al. figure 3 and page 197, 2<sup>nd</sup> paragraph). Thus, the compounds of the present invention have unexpected and superior qualities when compared to the Lee compounds.

Turning to Nothofer, Applicants respectfully point out that the document is not proper prior art. Applicants contacted the publishers of *Chem. Abstracts* and determined that the actual publication date was June 2, 2000, and the actual delivery date was June 27, 2000. The present application, by contrast, has an effective filing date of April 26, 2000 by claiming priority to European patent application EP 00 108 877.2. Thus, the rejections based on Nothofer should be removed.

With respect to Seda, the document does not teach, enable, disclose or suggest polyfluorenes. More specifically, with respect to the first formula in Seda, only monofluorenes are noted, not polyfluorenes as instantly claimed. Similarly, with respect to the second Seda formula, there are no polyfluorenes. Instead, Seda discloses polyesters having  $-O(Y-O)mR$  or  $-O(Y-O)m-CO-Z-CO-OR'$  end groups which, clearly, are not charge-transporting moieties. Thus, as Seda does not teach, enable, suggest or disclose each and every element of the instant invention, either alone or in combination, the rejections based on this document fails.

It is well-settled that picking and choosing portions from disparate references in order to formulate an obviousness rejection is impermissible. Further, "obvious to try" is not the standard upon which an obviousness rejection should be based. *See In re Fine*. And as "obvious to try" would be the only standard that would lend the Section 103 rejection any viability, the rejection must fail as a matter of law. Therefore, applying the law to the instant facts, the rejection is fatally defective and should be removed.

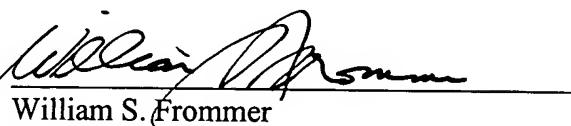
Consequently, reconsideration and withdrawal of the Section 102 and 103 rejections are believed to be in order and such actions are respectfully requested.

### CONCLUSION

In view of the foregoing amendments, it is believed that all of the claims in this application are patentable, and early and favorable consideration thereof is solicited.

Respectfully submitted,  
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